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PRELIMINARY STUDIES OF NORTH CAROLINA ORTHOPTERA.

BY JAMES A. G. REHN and MORGAN HEBARD.

During a considerable portion of the time between April, 1904, and June, 1906, the junior author of this paper resided at Sulphur Springs, altitude 2,500 feet, a few miles from Asheville, North Carolina, and collecting in this order was done on many occasions. The resulting collections, of particular value as showing the character of the Orthopterous fauna of the intermontane valleys of the southern Appalachians, were further supplemented by collections made at Balsam and on the slopes and summit of Mt. Pisgah in the Pisgah Range and on the upper slopes and summit of Jones' Knob, Balsam Range, North Carolina. With these typical localities of the western portion of the State it seemed quite desirable to compare a representative series from some coastal plain locality, and in consequence the junior author secured from Mr. H. S. Brimley an extensive series of material taken chiefly at Raleigh. To still further supplement this the senior author was detailed by the Academy to examine portions of eastern North Carolina, collections being made at Edenton, New Berne and Winter Park near Wilmington in August, 1908.

The result of the study of these combined collections are given in the following pages.¹

The total number of specimens examined was seventeen hundred and twenty-three, belonging to one hundred and two species, of which seventeen are here recorded from North Carolina for the first time.

The following notes on the localities may be of interest:

Sulphur Springs, Buncombe County, North Carolina. Altitude, 2,500 feet. This locality was found to offer several distinct types of country, in all of which collecting was done, and on a sufficient number of dates to give an almost complete list of the species found in the vicinity. The rolling slopes of the surrounding country where not cleared are covered with a heavy forest of oak, chestnut, maple and other deciduous trees, and in the not heavy undergrowth of these tracts the most interesting species found were *Melanoplus carnegiei*

¹ See also these *Proceedings*, 1910, pp. 407-453, for a systematic study of the specimens of the genus *Ischnoptera* included in this series.

and *Melanoplus devius*. In the decaying chestnut logs of this woodland *Cryptocercus punctulatus* was also taken, and it is from these wooded areas that the great number of *Ischnoptera* come in the spring to nearby lights. In the open valleys and on the hillsides covered with short grass and low herbage *Eritettix simplex* was taken, while the edge of streams and marshy spots revealed many Tettigids. One small marsh full of cat-tails was found to harbor a large colony of *Truxalis brevicornis*. The poorer clay slopes and hillocks are often overgrown with stunted pines having an undergrowth chiefly of broomstraw, grasses and raspberry vines, and here *Orchelimum agile*, *Orchelimum minor* (in the trees) and several species of *Conocephalus*, including *C. nemoralis*, were taken. Collecting at night was found productive, and the following species were taken attracted to light: *Ischnoptera pensylvanica*, *I. coultoniana*, *I. uhleriana*, *I. borealis*, *I. bolliana*, *Microcentrum rhombifolium* and *Microcentrum retinerve*.

Mt. Pisgah (altitude, 5,740 feet) and *Pisgah Ridge*, junction of Buncombe and three other counties, *North Carolina*. On the upper slopes, covered with a heavy but low forest, chiefly composed of chestnut and other deciduous trees, Orthoptera were uncommon. The interesting captures were *Melanoplus devius*, *Gryllus neglectus*, *Nomotettix cristatus*, *Chloaltis conspersa* and *Melanoplus luridus*.

The summit bald proved to be inhabited by *Chorthippus curtipennis*, *Chorthippa viridifasciata*, *Melanoplus amplexans*, *Amblycorypha rotundifolia* and *Arphia sulphurea*.

Jones's Knob (altitude, 6,200 feet), *Balsam Mountains*, *Jackson County*, *North Carolina*. No Orthoptera whatever were found on the "balsam" (*Abies fraseri*) clothed summit of the mountain, but lower in the undergrowth of the heavy deciduous forest, especially in more open level grassy glades, the following interesting captures were made: *Melanoplus amplexans*, *Melanoplus divergens*, *Melanoplus luridus*, and *Atlanticus pachymerus*.

Edenton, *Chowan County*, *North Carolina*. August 20, 1908. At this locality collecting was done in a field of tall weeds and grasses and in wet drains along roadsides. The most important captures were *Orchelimum molossum* and *pulchellum*.

New Berne, *Craven County*, *North Carolina*. August 24, 1908. Three conditions were examined at this locality: first, bush and grass growth in a wet drain, where *Leptysma marginicollis*, *Orchelimum molossum*, *Conocephalus strictus* and *Phylloscyrtus pulchellus* were probably the most noteworthy species taken; second, a wet, meadowy area with low lycopodium-like growth in many places and with inter-

spersed dry spots tangled with smilax, the most striking captures being *Melanoplus decorus*, *Clinocephalus elegans*, *Amblytropidia occidentalis*, *Paxilla obesa*, *Neotettix femoratus* and *Tettigidea prorsa*; third, tall dry brush in tall rather open pine woods where *Mermiria alacris* and *Schistocerca alutacea* and *americana* were secured.

Winter Park, New Hanover County, North Carolina. August 26, 1908. At this point which is between Wilmington and Wrightsville, collecting was done in a piece of moderate-sized, long-leaved pine woods, the drier portions of which were carpeted with wire-grass and the moister hollows grown up with waist-high grass. The drier sections were frequented by *Arphia xanthoptera*, *Scirtetica picta*, *Hippiscus rugosus*, *Psinidia fenestralis*, *Syrbula admirabilis*, *Orphulella pelidna*, *Melanoplus keeleri* and *Amblycorypha uhleri*. The wet grassy areas were inhabited by *Clinocephalus elegans*, *Melanoplus decorus*, *Paroxya atlantica*, *Orchelimum glaberrimum* and *Odontoxiphidium apterum*. The most striking species found in both habitats was *Mermiria alacris*.

The number of species taken at each of the principal localities was as follows: Edenton, ten; New Berne, twenty-eight; Winter Park, nineteen; Raleigh, fifty-seven; Sulphur Springs, fifty-one; Balsam, four; Jones's Knob, five; Mt. Pisgah, several elevations, fifteen.

A few records from Bayville and Cape Henry, Princess Anne County, Virginia, based on material taken by the senior author in 1908, are included to make the report on that year's collecting complete.

Many species have been recorded from Raleigh by Brimley in a recent paper of his on the Orthoptera of that region,² and full credit for the pioneer work in faunistic Orthopterology in North Carolina must be given to his paper and to the very important study of a number of localities in the State made by Morse,³ both of which are referred to in the following pages.

BLATTIDÆ.

Ischnoptera deropeltiformis (Brunner).

At Sulphur Springs two adult males of this species were taken on May 8 and 10, 1904, an immature male on April 13th of the same year and an immature female captured September 23, 1905. The Raleigh series contains a very interesting lot of ten adult females taken or bred on dates ranging from May 25 to June 25, 1904, and June 7 to July 1, 1905. An immature female taken June 21, 1904, was collected

² *Ent. News*, XIX, pp. 16-21, 1908.

³ *Carnegie Inst. Publ.* No. 18, 1904.

under pine straw and rotten wood in pine woods, while the one adult female with capture datum was taken from under rubbish in field.

The series of females shows quite a little individual variation in general size, the extremes of the series of that sex measuring as follows:

Length of body.....	13.5 mm.,	17. mm.
Length of pronotum.....	4 "	4.5 "
Greatest width of pronotum.....	5 "	6.8 "
Length of tegmen.....	4 "	4.8 "
Greatest width of abdomen.....	6.9 "	8.2 "

In coloration two points of variation are apparent: first, the tegmina of the females are decidedly blackish in some specimens, dull brownish in others; second, the femora vary in the presence or absence, or depth when present, of the blackish coloration, the majority of the specimens having the femora ferrugineous like the tibiae.

***Ischnoptera johnsoni* Rehn.**

A single adult female taken at Sulphur Springs, June 3, 1904, and two adult males secured at Raleigh, May 24, 1905, and June 8, 1904, are contained in the collection. The single Sulphur Springs specimens was taken in low herbage near the edge of the woods.

***Ischnoptera pensylvanica* (De Geer).**

Two males of this species taken at Sulphur Springs, May 25 and 30, 1904, and one of the same sex from Raleigh, June 2, 1904, are in the collection. In one of the Sulphur Springs specimens the blackish area of the disk of the pronotum is very solid and extensive, crowding the yellowish lateral borders to very narrow edgings. The other Sulphur Springs individual and the Raleigh specimen have the more normal type of pronotal coloration.

The specimens taken at Sulphur Springs were captured at night attracted to light.

***Ischnoptera divisa* Saussure and Zehntner.⁴**

The present collection includes five males and two females taken or bred at Raleigh, June 9-15, 1904, and May 22, June 9 and July 6-8, 1905. Data on the specimens inform us that both females were taken by sugaring, one of the males flew into a house at night and three of the same sex were bred.

⁴This is the species referred to by Brimley as *I. coulöniana* (*Ent. News*, XIX, p. 16), on the basis of material identified by the senior author. Saussure's *coulöniana* has since been shown by us (these *Proceedings*, 1910, p. 433) to belong to another species.

***Ischnoptera coulöniana* Saussure.⁵**

A series of eighteen male and twenty female adult individuals from North Carolina have been examined. The Raleigh series contains sixteen males and twenty females, taken from under bark of dead pines or bred on dates ranging from June 2 to July 1, 1904, while two adult males and an immature female were taken at Sulphur Springs, June 5, 1904, at night attracted to light.

The series before us presents a perceptible amount of variation in size and color, the size extremes of both sexes being as follows (all the measured specimens being from Raleigh):

	♂	♂	♀	♀
Length of body.....	20.5 mm.,	21.5 mm.,	18.5 mm.,	22.5 mm.
Length of pronotum.....	4.8 “	5 “	4.8 “	6 “
Greatest width of pronotum.....	6 “	6.5 “	7.2 “	8.2 “
Length of tegmen.....	9.2 “	21.8 “	7.5 “	8 “

The more usual type of coloration is that described by Blatchley and found in the type of Scudder's synonymous *hyalina*, the disk of the male pronotum being pale reddish ochraceous, while the other extreme, to which belonged the type of *coulöniana*, has the same area more or less infusate, particularly cephalad. The depth of this infuscation is very variable and it is found clearly defined in but five of the males examined, although suggested by points and lines in several others. In the female much the same thing occurs as in the male, but less clearly defined in most of the cases.

***Ischnoptera uhleriana* (Saussure).**

The series of this species before us is quite extensive, consisting of ninety-nine males and six females, ninety-two males having been taken at Sulphur Springs on dates between May 8 and June 13, 1904, and in April, 1906, the remainder of the series being from Raleigh, taken June 1 to July 1, 1904. The memoranda with the latter specimens show they were taken from under the bark of dead trees, attracted to light in houses or bred. The Sulphur Springs specimens were all taken attracted to light.

The coloration of the present series varies but little and then only in the intensification or lightening of the general color. In but one male is there a darker discal area on the pronotum, and in that case the intensification is not strongly marked and the form of the supra-

⁵ C. f. these *Proceedings*, 1910, p. 433.

⁶ *Orth. Indiana*, p. 183.

anal plate is typical of *uhleriana*. Two of the females have the disk of the pronotum darkened, much as in *divisa*, but the tegmina are of the subtruncate *uhleriana* type and the form of the supra-anal plate is equally distinctive.

Ischnoptera uhleriana fulvescens Saussure and Zehntner.

Seven males from Raleigh, taken in June and July, 1904, are referred to this form.⁷

These specimens were taken under conditions similar to the Raleigh individuals of true *I. uhleriana*.

Ischnoptera borealis Brunner.

While usually mistaken at first sight for *uhleriana*, this species is readily separable by its usually smaller size and distinctly transverse and apically rotundato-arcuate supra-anal plate of the male. A series of forty males of this species from Sulphur Springs were taken on dates ranging from May 6 to June 12, 1904, and a single female was collected at Lillington, Harnett County, on June 28, 1904, by Brimley. The last-mentioned specimen was taken from under a log in a wet place in woods.

The general size is quite below the average of *I. uhleriana*, the male extremes of the present series measuring as follows:

Length of body.....	12.8 mm.,	14	mm.
Length of pronotum.....	3	"	3
Greatest width of pronotum.....	3.8	"	4.3
Length of tegmen.....	14.5	"	18

The tegmina of the larger specimen are unusually long, no other individual in the series approaching it at all closely in this respect.

From early May to the middle of June this species and *Ischnoptera uhleriana* could be found almost every night about the lights.

Ischnoptera bolliana Saussure and Zehntner.

The series before us consists of four males and two females taken at Raleigh, May 30-31, and June 1-8, bred or attracted to light in houses, and five males taken at Sulphur Springs between May 8 and June 9, 1904. The coloration of the males is quite uniform, the disk of the pronotum being dark with a medio-longitudinal paler bar dividing it in two sections in all the specimens. The females are similar in coloration to the type of the synonymous *Kakerlac schaefferi*.

This was one of the scarcer species at Sulphur Springs where all the

⁷ For comments on the relationship and intergradation of *I. uhleriana* and *I. u. fulvescens*, with remarks on the Raleigh series, see the present authors, *Proc. Acad. Nat. Sci. Phila.*, 1910, pp. 439-442.

specimens were taken at night attracted to the lights. The lights referred to here and elsewhere in this paper at Sulphur Springs were the electric lights along the verandas of the Asheville School, which is situated on the edge of the heavy deciduous forest. The roaches attracted to these lights would usually fly about wildly for a time and then rest quietly on the nearby walls and ceilings unless disturbed.

Ceratinoptera lutea Saussure and Zehntner.

A single female from Raleigh, taken June 23, 1904, from under rubbish, is in the collection. It fully agrees with a Florida individual of the same sex.

Cryptoceros punctulatus Scudder.

A most interesting series of this singular roach is now before us, demonstrating the vertical range of the species in North Carolina to be at least three thousand feet, specimens in the collection being from Sulphur Springs, twenty-five hundred feet, and Old Bald Mountain, fifty-five hundred feet elevation. The localities represented are: Sulphur Springs, May 25, June 3-13, 1904, seventy-nine individuals of both sexes, adult and immature; Old Bald Mountain, 5,500 feet elevation, May 14, 1904, three adults and one immature individual. An adult individual in the collection of the Academy taken at Blowing Rock, Watauga County, by Joseph Willcox has also been examined.

These insects are found in the partially decayed chestnut logs in the forest. They were never found except in parts of the logs where the decayed wood was soft, punky and wet. In such places a colony of a number of specimens would be found in galleries just under the bark and in the log itself, often several specimens in close proximity. The localities from which the species is now known are New York; Pennsylvania; Virginia; Kentucky; Cumberland Gap, Kentucky; Tennessee; North Carolina; Sulphur Springs, Old Bald Mountain and Blowing Rock, N. C.; Rome and Clayton, Ga.; California; Glendale and Divide, Ore.

MANTIDÆ.

Stagmomantis carolina (Johannson).

An immature female of this species was taken August 19, 1908, at Bayville, Va., by Rehn. Two adult females in the Hebard Collection are from Montgomery County, Virginia, and South Carolina. The latter has the wings roseate.

ACRIDIDÆ.

Paratettix cucullatus (Burmeister).

This species is represented by a series of twenty-one North Carolina

specimens from the following localities: Raleigh, April 7, May 19 and 26 and July 8 and 18, 1904, three males and three females; Sulphur Springs, April 24 to June 12, 1904, six males, nine females.

The majority of the specimens show a tendency to approach *P. texanus*, or rather *P. cucullatus texanus* as we believe it should be, but they are certainly more closely related to specimens from Pennsylvania than others from Texas. The data with the Raleigh and Sulphur Springs specimens is to the effect that they were secured on damp, low ground near water.

***Acrydium hancocki* (Morse).**

Three female specimens taken at Sulphur Springs, April, 1906, May 7 and September 28, 1904, belong to this species. An individual of the same sex from White Top, Va., elevation, 5,678 feet, in the Academy collection is inseparable. All four specimens are of the long-winged type, and in all but one Sulphur Springs individual is the pronotum variegated with velvety-black in addition to the paired post-humeral trigonal patches on the same, which are present in all the specimens.

The previous North Carolina records are those of Morse, viz., Asheville, Linville, Pineola, Roan Mountain 5,500 feet, and Roan Valley, while the White Top record is the first one from the State of Virginia.

***Acrydium ornatum* (Say).**

A single short-winged female of this species was taken at Sulphur Springs, May 9, 1904. Morse has recorded it from a number of localities in the State.

***Acrydium obscurum* (Hancock).**

The collection contains an extensive series of this species: eight males and ten females from Raleigh taken April 7 to May 19, 1904, and sixteen males and nineteen females taken at Sulphur Springs, May 1 to 15, 1904. All the specimens in this series are long-winged and numerous shades of ochraceous, rusty-red and deep brown are to be found in it, while a considerable number of individuals possess the paired velvety-black post-humeral trigonal markings.

Morse has recorded this species from Asheville, Pineola, Roan Mountain and Tunis, N. C.

***Neotettix femoratus* (Scudder).**

The statement made by Hancock⁸ on Scudder's authority regarding the whereabouts of the type of this species is incorrect. The type is

⁸ *Tettigidae of N. Amer.*, p. 96.

not lost, and to-day in good condition it forms part of the collection of the American Entomological Society, from which it was described. From the evidence of this important specimen it appears likely that *Neotettix bolivari* and *rotundifrons* Hancock are synonymous with Scudder's species, a possibility pointed out some time ago by Morse.⁹

The present collection contains an interesting series of fifty-six specimens distributed as follows: Winter Park, August 26, 1908, five males, three females, one immature specimen; New Berne, August 24, 1908, four males, one female; Raleigh, June 3–September 7, 1904, six males, seven females; Sulphur Springs, May 6–June 5, 1904, seven males, twenty females, two immature individuals. The series is dimorphic as to the length of the pronotum and wings, the long-winged type being represented by nine specimens, seven of these being in the Sulphur Springs series. The size variation is considerable, the New Berne specimens rather curiously being without exception as small or smaller than the smallest individuals from the other localities. Color presents numerous variations, some are blackish, others dull reddish, some dusty gray-brown, others shades of ochraceous, while the shoulder markings are present in more than half of the series, occasionally with a well-developed humeral "saddle."

The type from Maryland is short-winged and matches in size adult females from Raleigh, the color, however, is more yellowish-ochraceous than in any of the North Carolina specimens.

Morse has recorded this species from fourteen localities in North Carolina extending from Tarboro to Murphy and to an elevation of 5,500 feet on Roan Mountain.

Nemotettix cristatus (Scudder).

A single immature female of this species from 4,500 feet elevation on Mt. Pisgah, taken October 1, 1904, is the only individual of the species in the collection. Morse has recorded it from six localities in the State, but this record carries the vertical distribution to a greater height. This specimen was captured in the undergrowth of the low deciduous forest near its upper limit.

Paxilla obesa (Scudder).

This robust species has long been a will-o'-the-wisp in our work in the southeastern States, and it is with great satisfaction that we are able to record its capture at New Berne, August 24, four males and one female being taken in a wet meadow in company with *Clinocephalus elegans* and *Melanoplus decorus*. This capture considerably ex-

⁹ Publ. 18, Carnegie Inst., p. 25.

tended the range of the species, the most northern previous record being from Denmark, S. C. The range is now known to extend from Port Orange and De Funiak Springs, Fla., to New Berne, N. C.

The female and one of the males measure as follows:

	♂	♀
Length of body.....	10.5 mm.,	12.8 mm.
Length of pronotum.....	9.2 “	11 “
Length of caudal femur.....	6.7 “	8 “

***Tettigidea lateralis* (Say).**

A series of eighty-two North Carolina individuals are before us, this comprising the following: Winter Park, August 26, 1908, two females; New Berne, August 24, 1908, two females; Raleigh, April, 7-July 18, 1904, twenty-one males, sixteen females; Sulphur Springs, April 2-September 24, 1904, eight males, thirty females; Mt. Pisgah, 4,500 feet elevation, October 1, 1904, one adult male, one immature male, one immature female.

In this series the front margin of the pronotum is found to vary from broadly arcuate to distinctly angulate, regardless of locality or environment. The Raleigh series is overwhelmingly long-winged, but one in the whole thirty-seven individuals being short-winged, while in the thirty-eight Sulphur Springs specimens but two males and twelve females are short-winged. Both Winter Park representatives are long-winged, as well as the single adult from Mt. Pisgah and the two specimens from New Berne. Color variations are numerous and varied, and size variation is quite marked in the larger series.

***Tettigidea prorsa* Scudder.**

An immature male and an adult female taken at New Berne, August 24, 1908, belong to this rare species. The specimens were taken in a wet meadow in company with *Tettigidea lateralis* and *Paxilla obesa*. Both specimens are short-winged, as is also a male individual from Beach Haven, N. J., taken in the spring of 1907, the only other specimen of the species seen.

The range of the species is now known to extend from Georgia to east-central New Jersey, the only records in addition to those mentioned above being from Georgia, North Carolina and Denmark, S. C.

***Truxalis brevicornis* (Johannson).**

Three pairs from Raleigh, taken August 15 to September 15 in or on the edge of marsh, and an extensive series of twenty-four males and five females taken September 18 at Sulphur Springs represent

this widely distributed species. The Sulphur Springs series was captured among cat-tails.

All of the males are in the green and brown phase, four of the eight females in a uniform green phase and the remaining four in a uniform brownish phase.

Mermiria alaeris Scudder.

This beautiful species was found to be fairly numerous but very wary in oak scrub along the edge of pine woods at New Berne on August 24, and equally numerous but easier to secure in long-leaf pine woods at Winter Park on August 26. Two males and one female were secured at the former locality and five males and four females at the latter. In size there is considerable variation, which appears from the material in hand, comprising Florida material as well the North Carolina series, to be purely individual in character, more marked in the male than in the female sex. The coloration is quite constant, varying only in the extent of facial suffusion and the strength of the medio-longitudinal streak on the head and pronotum.

The only previous North Carolina record for the species is a doubtful one based on a young individual from Salisbury.

Syrbula admirabilis (Uhler).

The localities from which this species is represented in the collections are: Bayville, Va., August 19, one immature female; Edenton, August 20, one male, two females; Winter Park, August 26, two females; Raleigh, August 17–September 2, three males, four females; Sulphur Springs, September 24–October 6, one male, two females.

A variety of habitats are represented as the labels indicate a range of environment extending from dry pinewoods undergrowth at Raleigh and Winter Park to wet woods at Bayville and wet drains at Edenton.

In size the North Carolina specimens are nearer to individuals from New Jersey than they are to the extremely large Florida representatives.

Eritettix simplex (Scudder).

A most interesting series of one hundred and forty-eight specimens of this species taken at Sulphur Springs is in the collection. Of this representation seventy-eight are adult males, sixty-five adult females and five immature individuals, the dates extending from April 2 to June 12, the immature individuals having been taken on April 2 and 13. A pair from Raleigh, taken April 13 and May 5 in broom straw field, have also been examined.

The species was found locally plentiful in the low grasses of the

treeless slopes and valleys. The individuals with general color pale yellowish ochraceous were found almost invariably in the very bottom of the valleys, and seemed a color adaptation in their resemblance to the more plentiful whitish pebbles strewn about there.

Several questions have been brought into prominence by the examination of this material, the first being in regard to the name. Fortunately the type of *Gomphocerus simplex* Scudder¹⁰ is still in existence in good condition in the Academy collections, and several efforts to find some valid reason for recognizing the later and very poorly characterized *G. carinatus* Scudder from the "Middle States" having failed, we are under the necessity of uniting the two, *simplex* having six years' priority. At the present time we are not prepared to give any expression on the exact relationship of this species and the western allies with clavate antennæ, viz., *E. virgatus*, *tricarinatus* and *naviculus*.

The other point is relative to the presence of marked dimorphism and dichromatism in this species. The greater majority of the specimens of this species before us possess distinct supplementary carinæ on the dorsum of the head and pronotum, the type of the species belonging to this form, while nine males and seven females, representing both localities, have the supplementary carinæ lacking on the pronotum and weak or lacking on the head. A series of eight males and one female from Sulphur Springs are intermediate between the two extremes, having the supplementary carinæ very faintly and incompletely indicated on the pronotum and faintly or moderately indicated on the head.

There is a great amount of individual variation in the form of the lateral carinæ of the pronotum, some specimens having them subparallel, distinctly not constricted mesad and rarely very slightly convergent cephalad, while the great majority have the carinæ constricted more or less distinctly and sharply immediately cephalad of the middle. There is no correspondence between these two conditions and the presence or absence of supplementary carinæ. The distance between the lateral carinæ of the pronotum is variable. In general size the species varies considerably, particularly in the male sex.

The dichromatism noticed is typically exemplified by one form with the general color pale yellowish ochraceous and the postocular bars broad and solid, extending to the tegmina, and vandyke brown in color, while the other type, which is by far the more numerous, has

¹⁰ *Trans. Amer. Ent. Soc.*, II, p. 305, 1869. (Delaware.)

no solid postocular bars and the dorsal surface of the head and pronotum is marked with a pair of longitudinal velvety blackish or brownish lines. Between the two types are numerous individuals which seem to bridge more or less completely the gap between the extremes. In some the dorsum is uniformly dark with distinct broad, postocular bars, in others the dorsum is almost uniform dark while the postocular bars are lacking. The coloration of this species offers a curious parallelism to that of *Psolæssa texana* Scudder which we have recently treated in detail,¹¹ the pale type with the decided postocular bars being analogous to *Psolæssa buddiana*, the strongly dorsal bilineate type to *P. ferruginea* and the dull form to true *P. texana*.

The range of this species extends from Connecticut (New Haven) to northeastern Alabama (Valley Head and Lookout Mountain), east to Raleigh, N. C. Its zonal correlation would appear to be Carolinian.

Amblytropidia occidentalis (Saussure).

Two adult males and one adult female from Raleigh, taken April 13, 22 and May 19 in broomstraw fields and a series of seventeen immature individuals in three stages of development taken at New Berne, August 24, have been examined.

The only North Carolina records are from Raleigh, Selma and New Berne, these constituting the most northern reliable records for the species.

Orphulella pelidna (Burmeister).¹²

A single female of this species was taken at Cape Henry, Va., August 19, on dry beach grass, while at Bayville, Va., August 19, a single specimen of the same sex was secured at a wet spot in woods. At New Berne, August 24, six males and one female were secured in a wet meadow, while two males and one female were captured in dry pine woods at Winter Park, August 26. A series of twelve males and eleven females taken at Raleigh, July 18 to September 20, were secured in pine woods, in pasture, in stubble field and at the edge of marsh land.

¹¹ *Proc. Acad. Nat. Sci. Phila.*, 1908, pp. 381-383.

¹² After numerous attempts to differentiate Scudder's *Orphulella pratorum*, we are compelled to use the oldest available name and allow Scudder's name to remain in abeyance, to be properly associated or relegated to the synonymy at some future date. However, it might be well to state that in using the antennal character given by Scudder (*Canad. Entom.*, XXXI, p. 179) to separate *O. pratorum* and *pelidna*, nearly every specimen from the eastern United States which we have examined, and we have seen nearly a thousand individuals from that region, would fall into *pratorum*. We have never seen any specimens of *Orphulella* from Pennsylvania, the type locality of *pelidna*, except individuals of *O. speciosa*, while New Jersey specimens by Scudder's key would fall into *O. pratorum*. It seems quite likely to us that the antennal length is an unsatisfactory character.

Dichromorpha viridis (Seudder).

A single male of this species was taken in a wet spot in woods at Bayville, Va., August 19, and two males from Raleigh, taken July 18 and 20, on low ground are in the collection.

Morse has recorded the species from Norfolk, Va., and Greensboro, Salisbury and Raleigh, N. C.

Clinocephalus elegans Morse.

In a wet meadow at New Berne, on August 24, and in wet spots with tall grass in pine woods at Winter Park, August 26, this species was found quite numerous, a series of four males, ten females and two immature individuals being taken at the former locality and five males and nine females at the latter.

When compared with typical New Jersey specimens of *C. elegans* and Florida specimens of typical and nearly typical *C. e. pulcher* the North Carolina individuals are seen to be nearly intermediate, although a shade nearer true *elegans*. The peculiar coloration found in some individuals of *C. e. pulcher* is intimated in several specimens from Winter Park, but these lack the extreme development in this line occasionally found in the more southern form. The size is decidedly larger than the average of typical *elegans*, but in the male sex *pulcher* is distinctly larger than the North Carolina specimens of that sex.

The measurements of a pair from Winter Park are as follows:

	♂	♀
Length of body.....	18 mm.,	23.5 mm.
Length of pronotum.....	4 “	4.6 “
Length of tegmen.....	9.2 “	12 “
Length of caudal femur.....	10.8 “	13.8 “

Chloealtis conspersa Harris.

A pair of this boreal species was taken by the junior author, a male from an elevation of 4,500 feet on Mt. Pisgah, October 1, 1904, and a female from the summit of Jones's Knob, Balsam Mountains, 6,200 feet elevation, October 7, 1905. Morse has recorded this species from Jones's Peak (Jones's Knob) and Steestachee Bald in the Balsam Mountains, at elevations of from 5,500 to 6,000 feet. These constitute the only records for the species in North Carolina.

Both specimens here recorded were taken amid the undergrowth of deciduous forests.

Chorthippus courtipennis (Harris).

Three males and four females of this species were secured at the summit of Mt. Pisgah, elevation 5,740 feet, on October 1, 1904, where

it was the most plentiful species of the summit bald. Morse has recorded the species from Balsam, 4,500–5,700 feet, Cranberry, Linville, Grandfather Mountain, 4,500–5,000 feet, Roan Mountain and Roan Valley. From these records, all at present known from the State of North Carolina, it would seem that the species ranges in that State from about 3,200 feet (Cranberry) probably to the highest points in the State where suitable environment occurs.

Arphia xanthoptera (Burmeister).

The Sulphur Springs collection contains two males and five females of this species taken September 9 to 29, while two males from Raleigh taken September 2, a pair from New Berne taken August 24 and two females secured August 26, at Winter Park are in the collections. At Winter Park it frequented spots in the pine woods and the labels of the Raleigh material show it was secured at that place in pine woods and in field of broomstraw. High open scrub near pine woods was the habitat frequented at New Berne.

The species has been recorded from a number of North Carolinian localities, but the Winter Park and New Berne records are the first from the coast region.

Arphia sulphurea (Fabricius).

At Sulphur Springs this species was taken on dates extending from April 2 to June 13, a series of eighteen males and ten females being secured. Raleigh is represented by ten males and three females taken April 27 to May 19. On May 14, two males were taken at 5,700 feet elevation on the summit bald of Mt. Pisgah, this being the highest point from which the species has been recorded in North Carolina.

Chortophaga viridifasciata (De Geer).

This widely distributed species is represented by a series of ten males and fifteen females from Sulphur Springs, taken on dates ranging from April 13 to September 29. Two males and one female were also taken on Mt. Pisgah at an elevation of 4,500 feet on October 1. Three of the females in the Sulphur Springs series are extremely large for the species, one of the three, which are quite uniform, measuring as follows: length of body 31 mm.; length of pronotum 8; length of tegmen 27.2; length of caudal femur 16.5. The remainder of the series is nearer what might be called the usual size of the species. But one male in the Sulphur Springs series is in the green phase, although seven of the fifteen females are in the same condition. The Mt. Pisgah female is in the green phase.

Hippiscus phœniopterus (Burmeister).

A series of ten males and four females from Sulphur Springs, taken May 8 to June 13, 1904, and two males and one female from Raleigh, secured May 19 to July 21, 1904, in old fields represent this species.

Two males from Sulphur Springs and the female from Raleigh have the head, pronotum and caudal femora greenish, a condition seen in specimens from other localities and which is analogous to that noticed in some individuals of the genus *Gomphocerus*. This species is one of the forms which appears in the spring in company with *Eritettix simplex*, *Chortophaga viridifasciata*, *Arphia sulphurea* and *Hippiscus apiculatus* in the open grassy areas.

Hippiscus rugosus (Scudder).

Sulphur Springs is represented in the series of this species by six males and five females, taken September 2 to 29, while five males and two females secured at Raleigh August 4 to September 2 in pasture and broomstraw field are in the collection. Three males and four females were taken at Winter Park, August 26 on sandy spots in pine woods, where the species was numerous. The specimens from Winter Park are particularly interesting in that while the males are no larger than individuals of that sex from Sulphur Springs the females are considerably larger, in this respect exceeding any seen by the authors.

This species is now known to range on the Atlantic slope from southern Maine (Norway) to northern Florida (Lake City).

Hippiscus apiculatus (Harris).¹³

Twelve males and thirteen females, taken at Sulphur Springs April 13 to June 13, 1904, constitute the first record for the species from North Carolina and the first in the east with definite data from south of the District of Columbia.

The subdecussate pale pronotal markings are more or less marked in twelve specimens.

¹³ It is unfortunately necessary to substitute this name for "*Hippiscus tuberculatus*" of authors, which is quoted from *Acridium tuberculatum* Palisot de Beauvois (*Ins. Rec. d'Af. et Amer.*, p. 145, pl. 4, fig. 1) whose figure clearly pictures this species, but who placed as a reference to the species *Gryllus tuberculatus* Fabricius, an Old World species belonging to another genus, with which he considered his material from the United States identical. In consequence his name is not available and the next must be taken. Harris's *Locusta apiculata* (In Hitchcock, *Rep. Geol. Mass.*, 2d ed., p. 576, 1835) is merely a renaming of Beauvois's species appearing in this form:

"*Locusta* L.

apiculata, tuberculata P. de Beauv. F?"

Although unaccompanied by a diagnosis, this name is clearly intended to replace the misidentified *tuberculatum* of Beauvois, and as such we are under the necessity of using it.

Dissosteira carolina (Linnaeus),

A single female taken at New Berne, August 24, and one of the same sex from 4,500 feet elevation on Mt. Pisgah, taken October 1, 1904, have been examined.

Spharagemon bolli Scudder.

This species is represented by two males and four females from Sulphur Springs, taken September 18–24, and three males and one female from Raleigh taken August 19–September 9 in pinewoods.

The Raleigh female is somewhat larger than the average of the species.

Scirtetia picta (Scudder).

This species was found on bare sandy spots in pinewoods at Winter Park, August 26, two males and four females being taken. These specimens show an approach to *S. marmorata*, but this does not appear to be as decided as in the case of Eure, North Carolina specimens examined by Morse.¹⁴ The two localities here given are the only ones in North Carolina from which the species has been recorded, though doubtless it occurs in all suitable locations in the eastern part of the State.

Psinidia fenestralis (Serville).

On the dunes at Cape Henry, Va., August 18, three males of this ammophilous species were taken, while a pair was secured on bare sandy spots in pine woods at Winter Park, August 26.

The only previous North Carolina records were from Eure and Tarboro.

Trimerotropis maritima (Harris).

One male and six females taken at Cape Henry, Va., August 18, are of particular interest, as they furnish additional evidence on Morse's observations¹⁵ regarding the presence at this locality of examples apparently intermediate between *T. maritima* and *T. citrina* in addition to typical examples of each. Two of the females distinctly tend toward *T. citrina* in the color of the caudal tibiae, although the general coloration and minor structural features are essentially the same as in *maritima*. No typical *citrina* were taken by us at Cape Henry, where *maritima* occurred on the bare strand and on the *Ammophila* covered dunes.

Trimerotropis citrina Scudder.

This species, which six years ago was known from east of the Mississippi River by but one State record, has now been recorded in the

¹⁴ *Publ. No. 18, Carneg. Inst.*, p. 37.

¹⁵ *Publ. No. 18, Carneg. Inst. Wash.*, pp. 22 and 37.

eastern and southeastern States from nearly fifty different localities. In the collection before us is a series of eight males and three females from Raleigh, taken July 8 to September 13, and two males and four females from Sulphur Springs, secured September 27 and 29, 1905.

The records of this species in the eastern States extend from Maryland to northern Florida (Pablo Beach, Jacksonville, Carrabelle, Apalachicola, Ft. Barrancas and Warrington) and the coast of Mississippi (Gulfport), vertically distributed from sea-level to at least 2,500 feet (Sulphur Springs), wherever suitable environment occurs, the species being distinctly xerophilous. The Raleigh individuals were taken on sandy or dusty roads or at electric lights. This is a midsummer species, only occasional tattered individuals being found as late as the middle of September.

Leptysma marginicollis (Serville).

This paludicolous species is represented by a series of ten males and five females taken at Raleigh, on May 13 and September 9, 1904, and a single immature male taken at New Berne, August 24, 1908. The Raleigh specimens are fairly uniform in size.

Schistocerca alutacea (Harris).

At New Berne a single male of this species was taken in scrub near pine woods on August 24, while three males and three females were secured at Winter Park in dry spots in long-leaf pine woods, August 26. The New Berne specimen is of the yellowish fasciate type, while the Winter Park individuals are of the dull russet and vandyke brown type, very similar in coloration and size to specimens from the pine barren region of New Jersey. The Winter Park representatives all lack the medio-longitudinal stripe.

Schistocerca americana (Drury).

This species is represented by five males, two taken at Sulphur Springs, May 15 and June 5, 1904, two secured at the summit of Mt. Pisgah, 5,700 feet elevation, October 4, 1904, and the fifth captured at New Berne, August 24, 1908.

Schistocerca damnifica (Saussure).

A series of eleven males and six females taken at Sulphur Springs on dates ranging from April 2 to May 15 and from September 18 to 29, 1904, and five males, and one female taken at Raleigh, March 9 to April 13, and September 7, 1904, represent this species. The Sulphur Springs males are rather small when compared with the Raleigh individuals of that sex. At Sulphur Springs the specimens were all captured in the undergrowth along the edge of the deciduous forest.

Melanoplus atlanis (Riley).

This widely distributed species is represented by thirty-nine North Carolina individuals distributed as follows: Raleigh, July 1-24, July 22, August 3-15, September 22, twelve ♂, eight ♀; Lillington, June 28, one ♂; Sulphur Springs, May 6, June 13, September 18-28, six ♂, three ♀; Edenton, August 20, two ♂, one ♀; New Berne, August 24, two ♂, four ♀.

Melanoplus scudderi (Uhler).

This species is represented by a Raleigh series of seven males and ten females, taken August 25 and September 2-22, 1904. These specimens average about the same size as individuals from New Jersey. Upland fields, pastures and pine woods were frequented by this species at Raleigh.

Melanoplus carnegiei Morse.

This interesting form is represented by fourteen males and seventeen females taken at Sulphur Springs, September 17-29 and October 7, 1904 and 1905. The series is fairly uniform in size and with but little variation in general coloration. The only previous records for this species are the original ones from Denmark and Spartanburg, S. C., and Blue Ridge, Ga. In the vicinity of Sulphur Springs this was the most abundant short-winged *Melanoplus*. It was found usually in the undergrowth of the woods in the more open situations.

Melanoplus deceptus Morse.

In the Academy collection there is a single imperfect male of this species from "Tennessee." The only previous records were from Balsam (Jones's Peak), N. C., and Jasper, Ga..

Melanoplus devius Morse.

A series of six males and ten females from Sulphur Springs taken September 9 to 29, 1904-1905, and two males, seven females and one immature individual taken on the higher wooded slopes (5,000 feet) of Mt. Pisgah, October 1, 1904, represent this species, previously known only from Wytheville, Va., and Tipton, N. C. Both lots exhibit some individual variation in size, although this is more pronounced in the Sulphur Springs specimens, particularly the males. However, the original measurements given by Morse cover the extremes in size before us, the Pisgah females averaging very slightly smaller than Sulphur Springs individuals of the same sex. The Pisgah males are so few in number that comparison of that sex is of little value, but measurements of the females from both localities show that the apparently shorter femora of the Pisgah females is much more than a

mere proportional reduction. The average difference is 1.4 mm., the Sulphur Springs specimens averaging 12.9 (12.5–13.5), the Pisgah series 11.5 (11.2–11.8). The Mt. Pisgah specimens are, as a rule, darker and somewhat less contrasted than the Sulphur Springs series. The length of the furcula is, as stated by Morse, quite variable.

The species was never found in the least plentiful about Sulphur Springs. Its habitat proved to be constantly sylvan.

Melanoplus decorus Scudder.

This little-known species is represented by six males and one female from Winter Park, taken August 26, 1908, and four males from New Berne, August 24, 1908. In size there is quite a little variation as the caudal femora of the males range between 9.5 and 11.2 millimetres in length. The general coloration varies appreciably from a general gamboze-yellow to fawn color, while the coloration of the face varies from uniform with the body to walnut-brown. The blackish coloration of the tubercle of the subgenital plate of the male is quite striking.

The previously unique types were taken at Dingo Bluff, N. C.

At New Berne the species occurred in a piece of moist meadow land, and at Winter Park it frequented high grass in wet spots in long-leaf pine woods. The species was scarce at New Berne, but more numerous at Winter Park.

Melanoplus amplectens Scudder.

At Balsam this species was found at elevations of from 3,500 to 4,000 feet on October 7, 1905, while the same day it was secured at 5,000 feet elevation on Jones's Knob. On October 1, 1904, it was taken at 4,500 feet and 5,700 feet (summit) on Mt. Pisgah. Balsam is represented by two males and eight females, Jones's Knob by two males and three females and Mt. Pisgah by two males and six females.

Morse has already called attention to the variability of this species, and our material substantiates his remarks. The variation in the length of the tegmina is very considerable in some specimens, the extremes of the males measuring 4.2 and 7 mm., of the females 5.5 and 8, all measured being from Mt. Pisgah except the male with shortest tegmina, which is from Balsam. All the specimens of this species were found in distinctly sylvan surroundings where grass was present in some quantities, excepting in the case of those taken on the summit bald of Mt. Pisgah.

Melanoplus divergens Morse.

Three males and three females of this species taken at Balsam, 4,000 feet elevation, on October 7, 1905, are practically topotypes.

Morse's specimens having been secured at 5,000–6,000 feet at the same locality. The males all exceed the maximum body length given by Morse by at least 4 millimeters, but the other measurements of that sex and of the female are around Morse's maximum. These specimens were all taken in a grassy glade covered with a scattering growth of deciduous trees.

***Melanoplus femur-rubrum* (De Geer).**

All the North Carolina material of the *femur-rubrum* series seen is referable to De Geer's species, although the more austral *propinquus* has been recorded from the State. The series before us includes the first records from the coastal section of the States, the localities represented being: New Berne, August 24, 1908, two males; Edenton, August 20, 1908, two males, three females; Raleigh, August 20, September 4–10, four males, six females; Sulphur Springs, September 18–27 and October 6, 1904, eight males and six females.

At Edenton it was found in grassy drains and in high weeds, and at New Berne in meadow land.

***Melanoplus keeleri* (Thomas).**

This interesting species was found generally distributed, but scarce in pine woods at Winter Park, August 26, where three males and three females were taken. Raleigh is represented in our series by one male and three females taken in pine woods, broomstraw and upland field on August 19 and September 13 and 22, 1904.

These specimens are very slightly smaller than individuals from Pablo Beach, Fla., but equal to or very slightly larger than the measurements given by Scudder in his Revision of the *Melanopli*. The only localities for this species from the State in addition to the above are Smithville, Dingo Bluff and "North Carolina."

***Melanoplus luridus* (Dodge).**

A series of twenty-seven specimens represent this species, distributed as follows: Balsam, 3,500–4,000 feet, October 7, 1904, four males, two females; Jones's Knob, Balsam Mountains, October 7, 1905, five males, one female; Mt. Pisgah, 4,500 feet, October 1, 1904, eight males, seven females. Morse has recorded the species from a number of localities in the mountains of North Carolina. This appears to be the most plentiful species of *Melanoplus* on all the mountains of this region at altitudes above 4,000 feet.

***Melanoplus femoratus* (Burmeister).**

A single male of this species taken at Sulphur Springs, June 2, 1904, is in the collection. Morse has recorded it from the same locality.

Paroxya atlantica Scudder.

At New Berne a single female of this species was taken in wet meadow land on August 24, while at Winter Park it was fairly numerous in wet grassy depressions in pine woods, where, on August 26, seven males and two females were secured.

The specimens show a decided approach to the more northern form *Scudderi*, which is probably but a geographic race, the tegmina and caudal limbs in the North Carolina individuals being somewhat shorter than in Florida specimens.

This is the first record of the species from North Carolina.

Paroxya floridiana (Thomas).

This moisture-loving species is represented by one male and two females from Raleigh, taken August 22 and September 9, 1904, two females from Edenton, taken August 20, and two of the same sex from New Berne, secured August 24. At Edenton and New Berne it occurred on grasses in wet drains, while the Raleigh specimens are labelled "swamp" and "edge of marsh."

TETTIGONIIDÆ.***Scudderia texensis*** Saussure and Zehntner.

A male of this species, taken at New Berne, August 24, an individual of the same sex from Raleigh, taken August 30, and a female from Winter Park, taken August 26, are in the collection. The New Berne specimen was taken in scrubby undergrowth at the edge of open pine woods, at Winter Park it occurred in pine woods, while at Raleigh the species was secured in a broomstraw field. The present records are the first from North Carolina.

Scudderia curvicauda (De Geer).

A single female of this species from Raleigh, taken August 30, in pine woods, has been examined.

Scudderia furcata Brunner.

Three males and three females from Raleigh, taken in pine woods September 2-7, 1904, one male and three females from Sulphur Springs, September 17-28, 1904-5, and a pair from Bayville, Va., taken in mixed woods undergrowth, August 19, represent this species. Previous to this writing Raleigh was the only exact locality in the Atlantic States between New Jersey and southern Georgia from which the species had been recorded.

Scudderia cuneata Morse.

A male of this species from Raleigh represents the most northerly point at which the species has been taken. It was secured September

9, 1904, and is labelled "edge of marsh." No doubt this is the form recorded by Brimley as *S. furcijera*,¹⁶ which latter might readily be mistaken for this species, although its range is entirely southwestern and Mexican.

The previous records of *cuneata* are Alabama (type locality), Thomasville, Ga., and Pablo Beach and Miami, Fla. It is apparently a purely Lower Austral form.

Amblycorypha oblongifolia (De Geer).

A single male taken at New Berne, August 24, and another individual of the same sex taken at Bayville, Va., August 19, represent this species. At the former locality the species was taken in high weeds along a wet drain and at the latter it was secured in mixed woods undergrowth. These records are the first from either State.

Amblycorypha rotundifolia (Seudder).

This interesting species is represented by two specimens taken at high elevations, one, a female, from 6,000 feet on Jones's Knob, Balsam Mountains, October 7, 1905, the other, a male, from 5,740 feet on Mt. Pisgah, Pisgah Ridge, October 1, 1904. These individuals show no points of difference from Indiana specimens. The specimen from Mt. Pisgah was beaten from the low bushes growing on the summit bald, while the individual from Jones's Knob was found in the forest undergrowth.

Aside from one record from Georgia, these are the only positive records of the species from the South Atlantic States.

Amblycorypha uhleri Stål.

Three males taken at Raleigh, August 20–September 4, 1904, in pine woods and at light, and a single male secured at Winter Park, August 26, 1908, in wire grass in pine woods, represent this austral species. The Winter Park specimen has a somewhat larger tympanum than the other specimens and the pronotum is also relatively broader caudo-dorsad, but it is not separable from other specimens of the species examined. The same individual is yellowish in coloration instead of green, the color being extremely protective in the dry wire grass. The two localities given above are the only ones in the State from which the species has been recorded, Brimley having already recorded it from the first-mentioned.

Microcentrum rhombifolium (Saussure).

A single female from Raleigh, taken August 25, 1904, and an indi-

¹⁶ *Ent. News*, XIX, p. 19.

vidual of the same sex from Sulphur Springs, taken September 14, 1904, represent this species.

These records are the first with exact data from the State.

Microcentrum retinerve (Burmeister).

An interesting series of this species, consisting of seventeen males and one female, taken at Sulphur Springs, September 22–October 8, 1904–1905, is in the collection. This series is uniform in size and in all the males the tympanum is washed with two shades of brown proximad of the stridulating vein, which is also uniformly of the lighter shade of brown.

These specimens were all captured after dark attracted to light. No exact record of the occurrence of the species in North Carolina has been previously published.

Neoconocephalus mexicanus (Saussure).

Two females of this species, one from Raleigh, taken May 13, 1904, the other from Sulphur Springs secured, September 18, 1904, represent this austral species. These localities are the only ones in the State at which the species has been taken, the previous records being "North Carolina" (Karny) and Brimley's Raleigh information. The Sulphur Springs individual was attracted to light at night and so captured.

Neoconocephalus palustris (Blatchley).

A single male from Raleigh, taken in wet meadows, August 4, 1904, is in the collection. Brimley has recorded it from this locality, which is the only one in the Southern States at which the species has been secured.

Neoconocephalus retusus atlanticus (Bruner).

The material examined in the present connection corroborates the opinion previously expressed by us¹⁷ regarding the relationship of *retusus* and *atlanticus*. The series before us consists of six males and one female taken at Sulphur Springs, September 18 to October 6, 1904–1905, and four males and two females from Raleigh taken August 31–September 7, 1904, at light, in garden and in grassy places in pine woods. A single immature female taken at Bayville, Va., August 19, 1908, has also been examined. The Sulphur Springs series shows both color phases and is quite uniform in size, being almost typical *atlanticus*, as determined by comparison with paratypes. The Raleigh series is all in the green phase and shows little individual

¹⁷ *Proc. Acad. Nat. Sci. Phila.*, 1907, p. 303.

size variation, but very strongly approaches *retusus* in the longer limbs and ovipositor. This tendency is so great that the specimens are almost intermediate in character and can hardly be referred more to one than to the other.

As this interesting case can well be demonstrated by figures, the following measurements made from average individuals, when taken with those previously given by us,¹⁸ show the extent of geographic size variation in this species:

	♂		
	Asheville, N.C.	Raleigh, N.C.	Waycross, Ga.
Length of body.....	23 mm.,	24.5 mm.,	26 mm.
Length of pronotum.....	7 "	7.2 "	7.8 "
Length of tegmen.....	33 "	35 "	35.5 "
Length of caudal femur.....	19 "	20.8 "	23.5 "

	♀		
	Asheville, N.C.	Raleigh, N.C.	Waycross, Ga.
Length of body.....	29. mm.,	24.5 ¹⁹ mm.,	29.5 mm.
Length of pronotum.....	6.8 "	6.8 "	7.5 "
Length of tegmen.....	33.5 "	34. "	41.5 "
Length of caudal femur.....	21.8 "	24.2 "	28 "
Length of ovipositor.....	32.5 "	35 "	38.5 "

True *N. retusus* has been recorded from "Georgia," Waycross and Thomasville, Ga., St. Augustine and Chokoloskee, Fla. The record of *atlanticus* at Thomasville, Ga., made by the authors,²⁰ is erroneous, due to the non-association of the sexes, the record of *atlanticus* being based on males and that of *retusus* from the same locality on the easily recognizable female. A male of *atlanticus* from Montgomery County, Virginia, in the Hebard collection, has also been examined by us.

Orechelimum militare Rehn and Hebard.

A single male of this species was taken in high grass in moist spots in pine woods at Winter Park on August 26. The specimen is distinctly smaller than Georgia individuals, but otherwise it is quite typical. The range of the species is carried a considerable distance northward by the capture of this specimen.

Orechelimum glaberrimum (Burmeister).

A pair of this species was taken in meadow land at New Berne, on August 24, a single female in high grass in wet spot in pine woods at

¹⁸ *Supra*, p. 304.

¹⁹ Body considerably shrunken.

²⁰ *Proc. Acad. Nat. Sci. Phila.*, 1904, p. 795.

Winter Park, August 26, two males in a wet drain at Edenton, August 20, and one adult and one immature female in undergrowth in woods at Bayville, Va., August 19. A single male from Raleigh taken August 30, at edge of marsh, is also in the collection.

The specimens from North Carolina all have the head more or less decidedly reddish, and should be regarded as representing *O. erythrocephalum* Davis if this is considered a valid species, which the present authors believe is not the case. Sufficient material is in hand, from about a dozen localities ranging from New Jersey to north-central Florida to demonstrate to our satisfaction the great amount of individual variation in this species in the coloring of the head as well as that of the dorsum of the pronotum. The emphasis placed on the characters separating *erythrocephalum* from *vulgare* in the original description of the former, tends to mislead one, as *vulgare* is quite distinct in cercal and other characters and *glaberrimum* with which the specimens of *erythrocephalum* should have been compared is not mentioned.

Regarding the presence or absence of spines on the ventral carinae of the caudal femora, the following notes made from fourteen specimens of this species may be of interest: three specimens have 0-0, one 0-1, two 0-2, one 0-3, four 1-2, one 1-4, one 2-4, one 3-3. In size the species regularly increases southward, north-central Florida specimens being extremely large when compared with New Jersey, Delaware and Maryland individuals. Thomasville, Ga., representatives are hardly smaller than Jacksonville and other north Florida individuals, while North Carolina specimens are about intermediate in size between those from Georgia and Delaware. As has already been pointed out by the present authors, the length of the tegmina is quite variable.

***Orchelimum agile* (De Geer).²¹**

A series of eleven males and two females taken at Sulphur Springs, September 17-29, 1904 and 1905, and a single female taken at Raleigh, September 17, 1904, in upland pasture represent this species. The diversity in size in the Sulphur Springs series is considerable, aside

²¹ After carefully examining the literature bearing on the identity of the much-discussed *Locusta agilis* De Geer, we are compelled to retire Harris's *vulgare* in favor of the much older De Geerian name, which we believe to be undoubtedly based on the same insect. De Geer's locality was Pennsylvania and Harris's Massachusetts, and a comparison of material from the two States shows no reason for their separation. De Geer's figure is, to us, sufficient to fix the species. We are also of the opinion that *Orchelimum gracile* Harris is a synonym of *Conocephalus fasciatus* (De Geer).

from the length of the tegmina and wings which vary independently of general size. The coloration, however, does not vary in as marked a degree, being chiefly limited to the depth of infuscation of the median portion of the pronotal bar. The Raleigh female and one Sulphur Springs male are ochraceous instead of greenish or greenish-yellow in general color.

A single specimen of this species from Montgomery County, Virginia, in the Hebard Collection is the only record of the species from that State. Brimley has recorded the species from North Carolina at Raleigh.

Orchelimum molossum Rehn and Hebard.

This species, which was previously known only from northern Florida (Pablo Beach and Gainesville) and Georgia (Thomasville and Thompson's Mills), is represented by two males and two females taken in a wet drain at Edenton, August 20, a single female taken in high weeds on moist ground at New Berne, August 24, and five males and one female taken at Raleigh, September 4-31, 1904. In all probability the record of the closely allied *O. nitidum* at Raleigh made by Brimley²² really relates to this species. A specimen from Roslyn, Va., in the Academy's collection, taken in September by Mr. Caudell, shows this species to range to the vicinity of Washington. The North Carolina specimens exhibit considerable individual variation in size, but as is the case with *O. glaberrimum*, the average individual from Virginia and North Carolina is smaller than Georgia and Florida examples. The paired pronotal lines are sometimes absent, and vary considerably in intensity when present.

Orchelimum minor Bruner.

This beautiful species is represented by three males taken in low pines, fifteen to twenty feet from the ground at Sulphur Springs, September 2 and October 6, 1905, and a single female from Raleigh, taken September 20, 1904. Material has also been examined in this connection from Thompson Mills, Ga., and Atsion, N. J., the latter taken October 8, 1903, by the junior author.

The five males before us show very little individual variation in size, and as no measurements have ever been published for the species it seems desirable to give the more important ones of the specimens before us.

²² *Ent. News*, XIX, p. 20.

	Length of body.	Length of pronotum.	Length of tegmen.	Length of caudal femur.
Atsion, N. J.....	16.5 mm.,	4 mm.,	15 mm.,	13 mm.
Sulphur Springs, N. C.....	15.8 "	4 "	15 "	12.2 "
"	15.5 "	4 "	15 "	12 "
"	16 "	4.2 "	16 "	13 "
Thompson Mills, Ga.....	15 "	4.2 "	15 "	13.8 "

	Length of body.	Length of pronotum.	Length of tegmen.	Length of caudal femur.	Length of ovi- positor.
Raleigh, N. C....	19 mm.,	4.5 mm.,	16.8 mm.,	14.8 mm.,	11 mm.

The coloration is very rich and is more contrasted in the female than in the opposite sex. The colors vary but little in intensity in the five males, the green alone being slightly weaker in one individual than in the others. The paired yellowish lines on the dorsum of the abdomen are pronounced in most of the specimens, but distinct in all.

The range of this arboreal species is now known to extend from southern New Jersey south to north-central Georgia, Sulphur Springs being at the highest elevation (2,500 feet) from which the species has been recorded.

***Orohelimum spinulosum* (Redtenbacher).**

Three males and one female from Raleigh, taken September 9, 1904 from grassy edge of marsh, belong to this species, described from "North Carolina" and since unreported. Specimens from Chestnut Hill, Philadelphia and Tinicum, Pa., taken by the authors, show the range of the species to extend considerably to the northward.

***Orohelimum pulchellum* Davis.**

A pair taken at Raleigh, August 22 and 30, 1904, in a cat-tail swamp and at edge of marsh and a single male taken in a wet drain at Edenton, August 20, represent this species. Originally described from Dennisville, Helmetta and Trenton, N. J., this beautiful species is now known to range from north-central New Jersey (Helmetta) to eastern North Carolina. The original describer compared the species with *nigripes*, but its relationship is not with that species, the cerci being decidedly different. It is, in fact, much nearer to *O. spinulosum* and less closely to *O. minor*, the form of the cerci being of much the same type in the three. The Raleigh individuals are somewhat larger than the Edenton specimen.

Conocephalus strictus (Scudder).*Xiphidium strictum* of authors.

Three adult females taken at Raleigh, September 9-20, 1904, and two adult and three immature females secured at New Berne, August 24, 1908, belong to this species. At the former locality the species occurred in pasture, in broomstraw field and in grass along edge of marsh, while at New Berne it was taken in a piece of open meadow land.

The only previous record of the occurrence of the species in the southeastern States is Brimley's Raleigh note.

Conocephalus ensiferus (Scudder).*Xiphidium ensiferum* of authors.

This species is represented by a series of eight males and eight females taken at Sulphur Springs, September 2-29, 1905, and five males and five females secured at Raleigh, August 16 to September 9, 1904. At Raleigh it was secured at electric lights, at grassy edge of marsh, in grassy places in pine woods and in broomstraw field.

A pair from Raleigh and one female from Sulphur Springs are long-winged. The individuals before us vary but little in size. The localities cited above are, with the addition of Fort Reed, Fla., the only ones in the southeastern States from which the species is known. The Fort Reed record was based on immature material and, as intimated at the time, may belong to another species.

Conocephalus fasciatus (De Geer).*Xiphidium fasciatum* of authors.

This widely distributed species is represented in the present series by two males and one female from Sulphur Springs, September 18-28, 1904; three males and two females from Raleigh, August 15 to September, 1904; a pair from New Berne, August 24, 1908, and a single female from Edenton, August 20, 1908. These localities are the only ones in North Carolina at which the species has been captured.

Conocephalus brevipennis (Scudder).*Xiphidium brevipenne* of authors.

A single female from Edenton, August 20, 1908, and another specimen of the same sex from New Berne, August 24, 1908, represent this well-known species. With the addition of Brimley's Raleigh record one has all the known data on the occurrence of the species in North Carolina. At Edenton it was taken in a wet drain and at New Berne it occurred in open meadow land.

Five males from Bayville, Va., August 19, and one male from

Cape Henry, Va., August 18, have also been examined. At the former locality it occurred in low growth in mixed woods and at the latter among dune growth.

Conocephalus saltans (Seudder).

Xiphidium saltans of authors.

One male and three females from Sulphur Springs, September 18 to 28, 1904–1905, represent this species. The only previous records for the southeastern States are from Raleigh, N. C., and Thomasville, Ga.

Conocephalus nemoralis (Seudder).

Xiphidium nemorale of authors.

This easily recognized species is represented by a series of fifteen males and eight females, taken at Sulphur Springs, September 2 to October 6, 1904–1905. One female is long-winged, the bold pattern of the venation found in this species being proportionately more pronounced, giving this individual a peculiar appearance. Both sexes vary considerably in size, but in no case does this seem to be decided enough to prevent ready recognition of the species.

This is the only record of the species from the South Atlantic States.

Odontoxiphidium apterum Morse.

A single female of this species from Winter Park, taken August 26 in high grass in a wet spot in pine woods, considerably extends the range of this species northward. All the previously known records are of captures in Georgia and Florida. The Winter Park specimen is somewhat smaller than Pablo Beach, Fla., individuals, but otherwise inseparable. The specimen secured was the only one of the species seen.

Atlanticus dorsalis (Burmeister).

Four females of this species taken at Sulphur Springs, September 24, 1904, constitute the first record of the species, occurrence in North Carolina. The specimens were captured in the forest undergrowth and were the only ones noticed about the locality.

Atlanticus pachymerus (Burmeister).

A single male of this species was secured at an elevation of six thousand feet on Jones's Knob, Balsam Mountains, October 7, 1905. It was taken in the forest undergrowth.

GRYLLIDÆ.

Ellipes minuta (Seudder).

Two individuals of this species were taken at Sulphur Springs, June 12, 1904 on damp sand beside a stream. Brimley has recorded

this species from Raleigh, the only previous record from either of the Carolinas.

Nemobius fasciatus (De Geer).

From a careful study of a considerable series of material belonging to this and the following form, it seems necessary to consider them but geographic races of one and the same species. The evidence of intergradation is so great that it is almost impossible to place specimens from certain localities in one or the other of the two forms. As the only character by which *socius* could be separated from *fasciatus* is the length of the ovipositor relative to that of the caudal femur, the following measurements of the female individuals in the present series, in addition to some typical specimens of *socius* from other localities, may be of interest.

<i>Caudal femur.</i>	<i>Ovipositor.</i>									
	mm. 5.8	mm. 6	mm. 6.2	mm. 6.8	mm. 7	mm. 7.2	mm. 7.5	mm. 7.8	mm. 8	mm. 8.2
6.4 mm.....	T*									
6.8 mm.....	T							S	P	
7 mm.....			TT R	R			P			
7.2 mm.....		R					S		B	
7.5 mm.....					R			S R		
7.8 mm.....							C R			
8 mm.....						S		R		
8.5 mm.....										P

* T = Thomasville, Ga.

C = Cedar Keys, Fla.

R = Raleigh, N. C.

S = Sulphur Springs, N. C.

P = Mt. Pisgah, N. C.

B = Bayville, Va.

Each letter indicates a specimen.

One series consists of five females from Sulphur Springs, secured September 17 and 24, 1904, and thirteen males and four females from 4,500 feet elevation on Mt. Pisgah, captured October 1, 1904. A

single female from Bayville, Va., August 19, 1908, has also been examined. Of these specimens but one male is macropterous (Mt. Pisgah) and but one female (Mt. Pisgah) has tegmina almost as long as the body.

The Pisgah and Sulphur Springs lots each contain a single specimen having the ovipositor slightly shorter than the caudal femur, but as this is the exception and not the rule, we have considered the material from those localities to be *N. fasciatus*, while in our Raleigh series but one in seven has the ovipositor longer than the caudal femur, so we have placed the latter locality's representatives under *N. fasciatus socius*. The specimens tabulated above show the following differences in the proportion of these two parts:

Ovipositor longer (+) or shorter (-) than caudal femur.

Bayville, Va.....	.8 mm. +
Mt. Pisgah, N. C.....	.5 mm. +
“.....	1.2 mm. +
“.....	.8 mm. +
“.....	.3 mm. -
Sulphur Springs, N. C.....	1.0 mm. +
“.....	.3 mm. +
“.....	.3 mm. +
“.....	.8 mm. -
Raleigh, N. C.....	.5 mm. -
“.....	.3 mm. -
“.....	.2 mm. +
“.....	.2 mm. -
“.....	.8 mm. -
“.....	.8 mm. -
“.....	.2 mm. -
Cedar Keys, Fla.....	.3 mm. -
Thomasville, Ga.....	.8 mm. -
“.....	.7 mm. -
“.....	.4 mm. -
“.....	1.0 mm. -

The Sulphur Springs specimens are paler, more rufous and with more decided pattern than the other and more usual specimens. These may represent *N. canus* Scudder, but the structural characters given for that form do not hold in the present specimens, so it seems more desirable to consider them slightly aberrant *fasciatus*. A number of such pale, colored individuals from Massachusetts, New Jersey and Maryland have been examined by us.

Typical *Nemobius fasciatus* appears to be replaced in the entire Lower Austral zone of the southeastern States by *N. fasciatus socius*

although, as shown above, material from the borderland of the two forms is more or less intermediate in character.

Nemobius fasciatus socius Scudder.

This southern race of *N. fasciatus* is represented by two males and eight females from Raleigh, taken July 8-18, August 16-30 and September 2-20, 1904, and one male from New Berne, secured August 24, 1909. Of this series one pair from Raleigh are macropterous, the remainder being brachypterous.

The Raleigh specimens were taken in pine woods, in stubble and broomstraw field, in grass around edge of marsh and at electric lights.

Nemobius maculatus Blatchley.

Two males from Sulphur Springs, taken September 24, 1904, and two individuals of the same sex from Raleigh, secured September 15, 1904, are referred to this species after comparison with typical Indiana material.

This is the first authentic record of the species for the southeastern States.²³

At Raleigh the species was taken at the edge of a marsh.

Nemobius carolinus Scudder.

One male and two females from Balsam, taken at an elevation of 3,500 feet on October 7, 1905, and a pair from Raleigh, secured August 4 and September 5, 1904, represent this species.

The Raleigh specimens are somewhat larger than the Balsam individuals and the male proves the occurrence of macropterism in this species, the other representatives being of the usual brachypterous type.

At Raleigh the species was taken from under a plank in a garden and at light in house, while at Balsam the specimens were captured among damp grasses in the heavy deciduous forest.

The only previous North Carolina record is that of the types, which had no exact locality.

Gryllus pennsylvanicus Burmeister.

A series of six males and three females taken at Sulphur Springs, May 10-27 and June 5 and 13, are before us.

Gryllus neglectus Scudder.

Two males and two females taken at 4,500 feet elevation and on the summit bald of Mt. Pisgah, October 1, 1904, are referable to this form,

²³ The record of this species from Thomasville, Ga., made by the authors (*Proc. Acad. Nat. Sci. Phila.*, 1904, p. 799) is erroneous, the material having been brachypterous individuals of *N. fasciatus socius*,

which appears worthy of some designation whether specific or varietal. The measurements of these specimens are as follows:

	♂	♂	♀	♀
Length of body.....	16.5 mm.,	15.5 mm.,	20 mm.,	18 mm.
Length of tegmen.....	9 “	9.8 “	9 “	7.5 “
Length of caudal femur	10 “	10.8 “	11 “	11.5 “
Length of ovipositor.....			13 “	12.5 “

The original measurements of this species for some reason are erroneous, this being the case with all the species of *Gryllus* measured in the same paper,²⁴ the dimensions being little more than half the usual size of the forms. Allowance for this may cause the synonymizing with *neglectus*, of Blatchley's *Gryllus americanus*, the chief diagnostic characters of which, when compared with *pennsylvanicus* and *abbreviatus*, were stated to be the slender build, short tegmina and ovipositor. When compared with an authentic pair of *americanus* in the Academy's collection the Mt. Pisgah individuals are slightly larger but otherwise inseparable.

***Gryllus rubens* Scudder.**

This southern form is represented by a series of nine males and fourteen females from Raleigh, taken on dates ranging from April 16 to June 21 and also on September 7 and 13, 1904, a single male from Sulphur Springs taken June 5, a single male from Edenton, secured August 20 and one female from New Berne taken August 24.

There is a very great amount of individual variation in size in both sexes, the proportions of thirteen females from Raleigh being as follows:

Caudal femur.	Ovipositor.								
	10 mm.	10.8 mm.	11.5 mm.	11.8 mm.	12 mm.	12.2 mm.	12.5 mm.	12.8 mm.	14 mm.
10 mm.....	1	1	.....	1	.....	.....	.....	.....	.....
10.5 mm.....	1	.....	.....	1	.....	.....	.....
11 mm.....	2	.....	.....	.....	.....
11.2 mm.....	1
11.5 mm.....	2	1	.....
12 mm.....	2	.....	.....

²⁴ *Boston Journ. Nat. Hist.*, VII, pp. 427-429.

The above-mentioned records are the first for the species from North Carolina. At Raleigh it occurred in gardens, pastures, in broomstraw fields, in open places in woods and under rubbish, while at Edenton it was taken among weeds in a wet spot.

***Ecanthus angustipennis* Fitch.**

A single male from Sulphur Springs, taken September 29, 1904, is the first record of the species from North Carolina. An immature individual secured at Bayville, Va., August 19, 1908, constitutes the first Virginia record for the species.

***Ecanthus latipennis* Riley.**

A female individual in the instar preceding the adult condition taken August 19, 1908, at Bayville, Va., is the first record of the species in that State. It was taken in pine woods undergrowth.

***Ecanthus quadripunctatus* Beutenmüller.**

Four males and two females from Raleigh, taken June 29, August 30 and September 22, 1904, and one female from Sulphur Springs, September 24, 1904, represent this species. At Raleigh it occurred on garden weeds, in broomstraw and in upland fields.

Two males and one female were taken in heavy tangles among low dunes at Cape Henry, Va., August 18, 1908, these constituting the first Virginia record for the species.

***Ecanthus nigricornis* Walker.²⁵**

Two females taken at Raleigh, September 7 and 22, 1904, represent this rather robust species. One was taken in an upland field, the other from alders along stream in pine woods.

This is the first record of the species from North Carolina.

***Anaxipha exigua* (Say).**

Three males and two females taken at Raleigh, August 30 and September 9, 1904, belong to this species. Two males and two females secured at Bayville, Va., August 19, 1908, constitute the first record of the species in the latter State. At Raleigh it was captured in grasses around edge of swamp, while at Bayville it was taken in tall grass and brush in a wet spot in pine woods.

***Phylloscyrtus pulchellus* (Uhler).**

This beautiful species is represented by three males and two females taken at Raleigh, September 9, 1904, and a single female captured at

²⁵ We find it impossible to use the name *fasciatus* for this species, as Fitch did not propose it as a new name, but merely erroneously identified De Geer's *Gryllus fasciatus* which is clearly a *Nemobius*. After examining the literature, we fully agree with previous authors who have reached this conclusion.

New Berne, August 24, 1904. A pair from Bayville, Va., secured August 19, 1908, are the first individuals of the species recorded from that State.

At Bayville it occurred in company with *Anaxipha exigua* in a grassy and bushy wet spot in pine woods; at New Berne it was captured in rank growth along a drain and at Raleigh it was also taken with *Anaxipha* on bushes bordering swampy land.

Hapithus agitator Uhler.

A pair of specimens from Raleigh, taken in pine woods September 7, 1904, are particularly interesting as they are practically intermediate between *H. agitator* and *H. quadratus*. There seems to be little doubt but that *quadratus* is a southern race of *agitator*, the differential characters being the greater size, the proportionately longer legs and more complex venation. The Raleigh individuals have distinctly longer legs than specimens of true *agitator*, though their general relationship appears to be very slightly nearer the northern form. Taken with the measurements already given by the authors,²⁶ the proportions of the Raleigh specimens may be of interest.

	♂	♀
Length of body.....	10.5 mm.,	11.5 mm.
Length of pronotum.....	1.8 “	2 “
Length of tegmen.....	6.3 “	7.5 “
Length of caudal femur.....	8.5 “	9.3 “
Length of ovipositor.....	.....	7.5 “

Proc. Acad. Nat. Sci. Phila., 1907, p. 318.